

**Melvern Lake
1999 Water Quality Report**

1. General.

- a. **Project location.** Melvern Dam is located approximately 4 miles west of Melvern, Kansas, at river mile 436 of the Marais des Cygnes River, which is a tributary of the Osage River. The project watershed encompasses 349 square miles.
- b. **Authorized project purposes.** Flood control and water quality are the primary project purposes; equally important, however, are its water supply, fish and wildlife resources, and recreation benefits.

c. Pertinent data.

Pools	Surface Elevation (ft. above m.s.l.)	Current Capacity (1,000 A.F.)	Surface Area (acres)	Shoreline (miles)
Flood Control	1,057	208.2	13,935	
Multipurpose	1,036	152.1*	6,912	101
Inactive		22.0**		
Total		360.3		

Total Drainage Area: 349 sq. miles

Average Annual Inflow: 164,670 acre-feet

* Estimate based on most recent hydrographic survey.

** Contained in multipurpose pool.

2. Activities and studies of the year.

Monthly herbicide and nutrient sampling was conducted by lake project personnel, with technical and analytical support from PM-PR-W, April-September 1999 at one inflow station, three lake stations (two depths), and the outlet. Nutrient samples were shipped to the Chemical and Materials Quality Assurance Laboratory (CMQAL) in Omaha for analysis while the herbicide samples were shipped to the PM-PR-W laboratory for analysis of four of the most commonly occurring herbicides by the ELISA (enzyme linked immunosorbent assay) method. Ten percent of the herbicide samples were shipped to the CMQAL to be analyzed by GC (Gas Chromatography) for quality control purposes. All generated data were entered in excel spreadsheets as an interim to the EPA national water quality data management system, NEW

STORET, which is still in the developmental stage. Table 1 at the end of this report includes all the available nutrient and herbicide data for the past years from 1996-1999.

The OF-ME is to be commended for its continued support of water quality monitoring of Melvern Lake and its tributaries. The OF-ME personnel deserving special recognition include Charles Hall and Robert Carlisle.

3. Existing Conditions.

FIGURE 1: ME-41

a. Inflow.
 The Marais des Cygnes River near Reading, Kansas, (station ME-41), was sampled monthly from April-September 1999. It exhibited typical seasonal concentrations of total nitrogen (i.e., $\text{NH}_3 + \text{NO}_2 + \text{NO}_3 + \text{TKN}$) with a mean and maximum concentration of 1.05 mg/L and 1.79 mg/L, respectively.

These concentrations continue to exceed the EPA criterion of 1 mg/L for streams. Figure 1 shows the trend for total nitrogen concentrations over the past four years. As can be seen from this graph, levels have typically

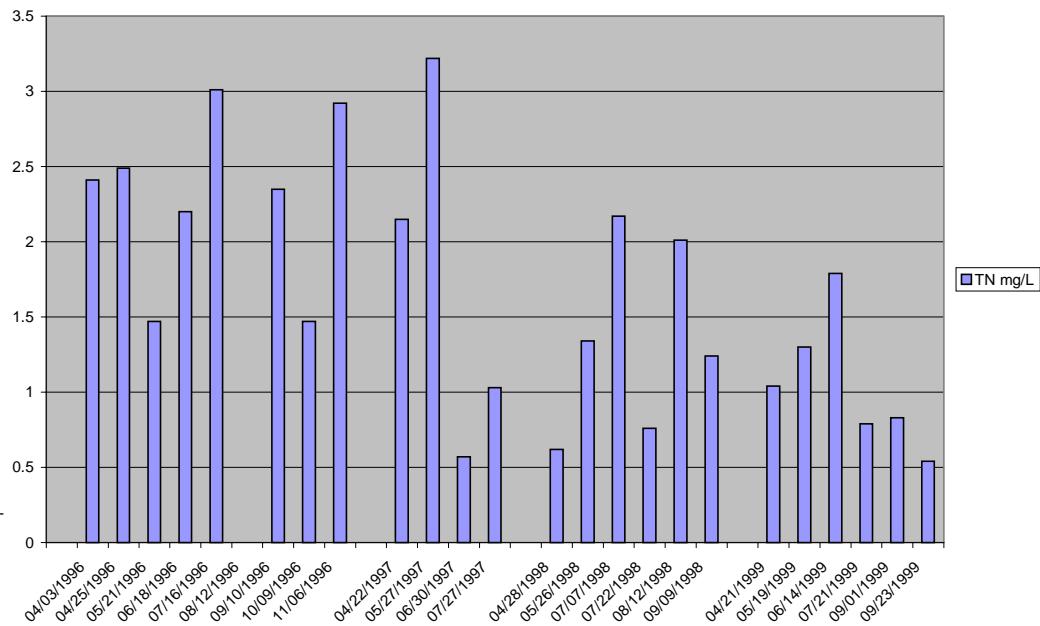
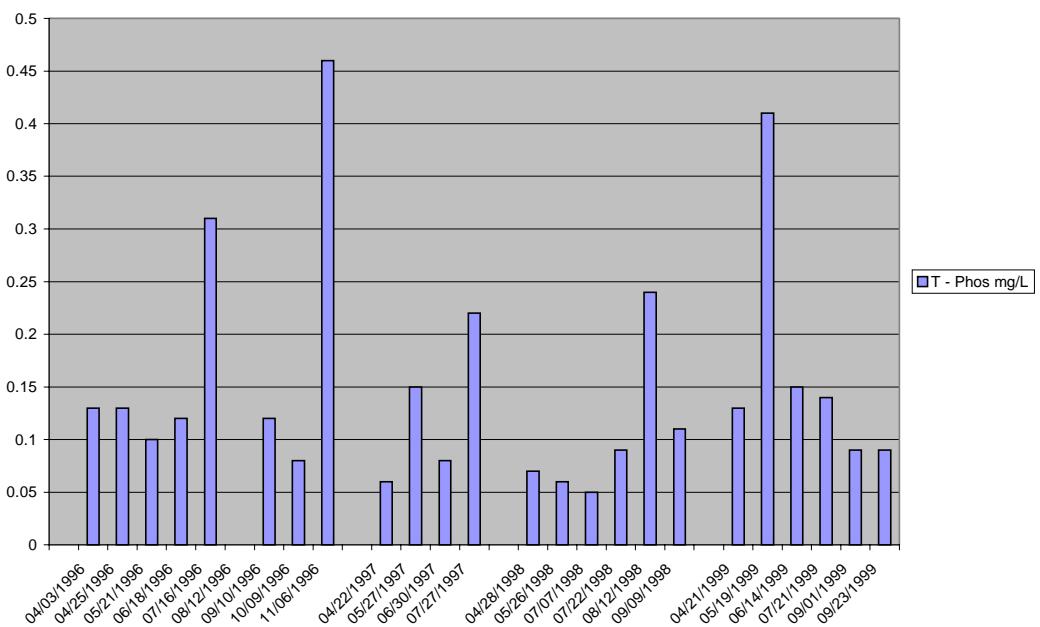


FIGURE 2: ME-41



been above eutrophic levels with spikes occurring during high inflows such as June 1999. Total phosphorus (TP) concentrations (mean, 0.17 mg/L and maximum, 0.41 mg/L) also continued to equal or exceed the EPA criterion of 0.1 mg/L for the protection of the aquatic ecosystems. This trend can be seen in figure 2. Atrazine, the most commonly detected herbicide over the period of record, was present in 100% of the 1999

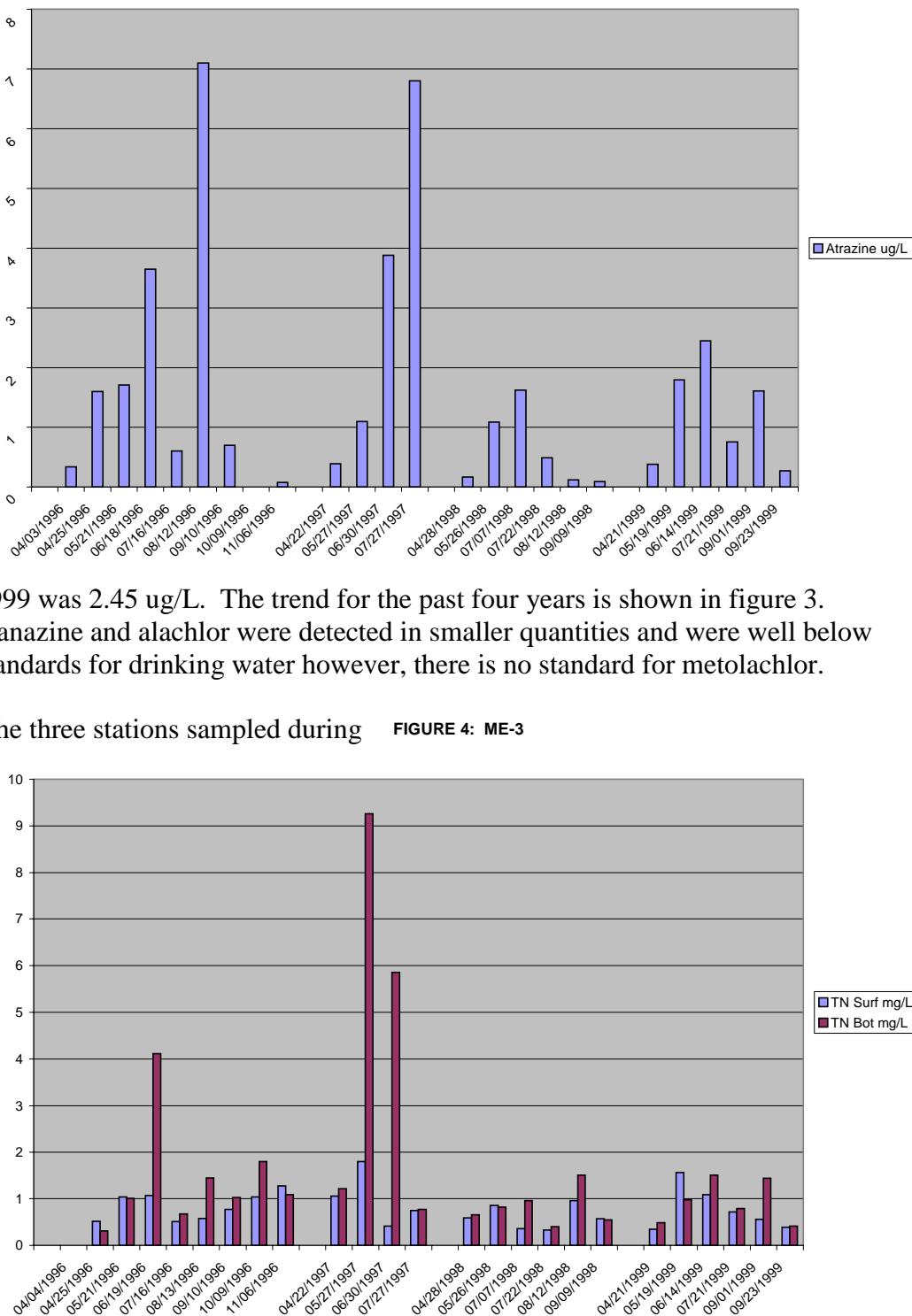
FIGURE 3: ME-41

samples. The 1999 mean concentration of 1.21 ug/L did not exceed the 3 ug/L MCL for drinking water supplies but did exceed the criterion for the protection of aquatic ecosystems (1 ug/L). The maximum observed concentration

of atrazine in 1999 was 2.45 ug/L. The trend for the past four years is shown in figure 3. Metolachlor, cyanazine and alachlor were detected in smaller quantities and were well below existing EPA standards for drinking water however, there is no standard for metolachlor.

b. Lake. The three stations sampled during the six-month sampling period from mid April-September were the forebay (ME-3), midlake (ME-16), and uplake (ME-30). As can be seen in figures 4, 5, and 6,

FIGURE 4: ME-3



nutrient concentrations were typical of the impoundment over the period of record. These three graphs show the relationship between surface and bottom concentrations for the past four years. Concentrations within the water column appear to be fairly uniform. The

high spikes can be attributed to high inflows and temperature differences between surface and bottom waters. The 1999 nutrient concentrations reflect a moderately enriched state for the impoundment, which receives significant nutrient loading from its major inflow. The total nitrogen mean and maximum concentrations in the surface waters were forebay, 0.78 mg/L and 1.56 mg/L, respectively; midlake, 0.71 mg/L and 1.25 mg/L, respectively; and uplake, 1.37 mg/L and 2.07 mg/L, respectively. Bottom mean and maximum total nitrogen concentrations

were 0.94 mg/L and 1.51 mg/L, respectively at ME-3, 1.19 mg/L and 2.32 mg/L, respectively, at ME-16, and 1.93 mg/L and 2.76, respectively, at ME-30. Three of these concentrations exceeded the 1 mg/L EPA eutrophy

criterion. Total phosphorus mean and maximum concentrations in the surface waters were

FIGURE 5: ME-16

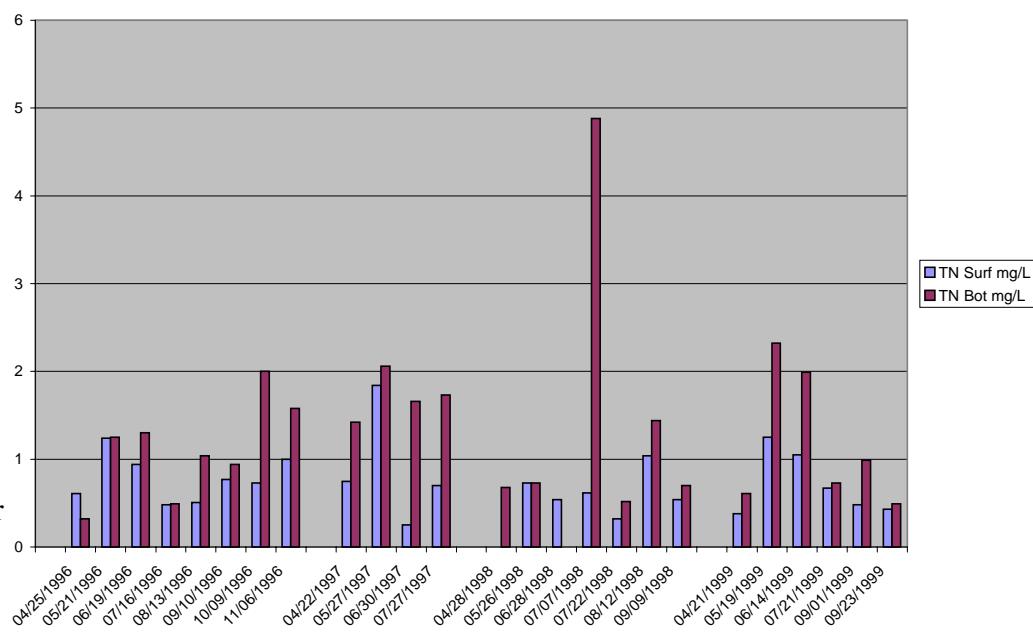
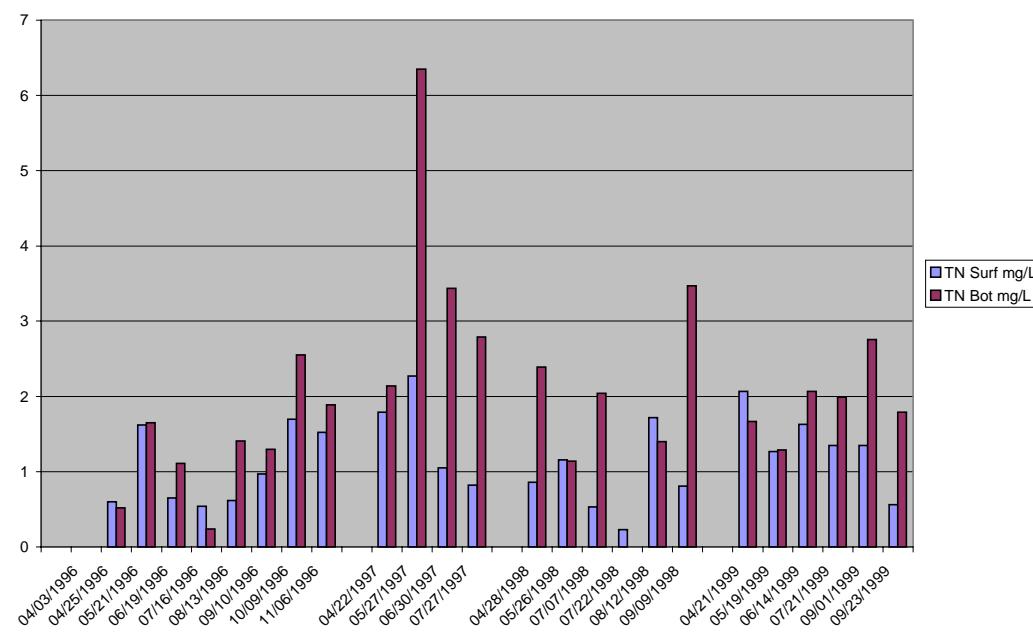


FIGURE 6: ME-30



forebay, 0.14 mg/L and 0.53 mg/L, respectively; midlake,

0.12 mg/L and ³
0.96 mg/L,
respectively;
and uplake,
0.25 mg/L and
0.39 mg/L,
respectively.

All the
concentrations
exceed the
0.05 mg/L
EPA eutrophy
criterion.

Bottom mean
and maximum
total
phosphorus

concentrations were 0.14 mg/L and 0.40 mg/L, respectively, at ME-3, 0.28 mg/L and 0.96 mg/L, respectively, at ME-16, and 0.51 mg/L and 1.18 mg/L, respectively, at ME-30. As with TN, the bottom concentrations of TP play a significant

role in the
reservoir's
eutrophy.

Figures 7, 8,
and 9 show
total
phosphorus

concentrations
at the
surface and
bottom
depths
throughout the
lake from
1996-1999.

The total
phosphorus concentrations tend to follow the same pattern as the total nitrogen concentrations,
increasing from the lower lake to the upper lake area.

FIGURE 7: ME-3

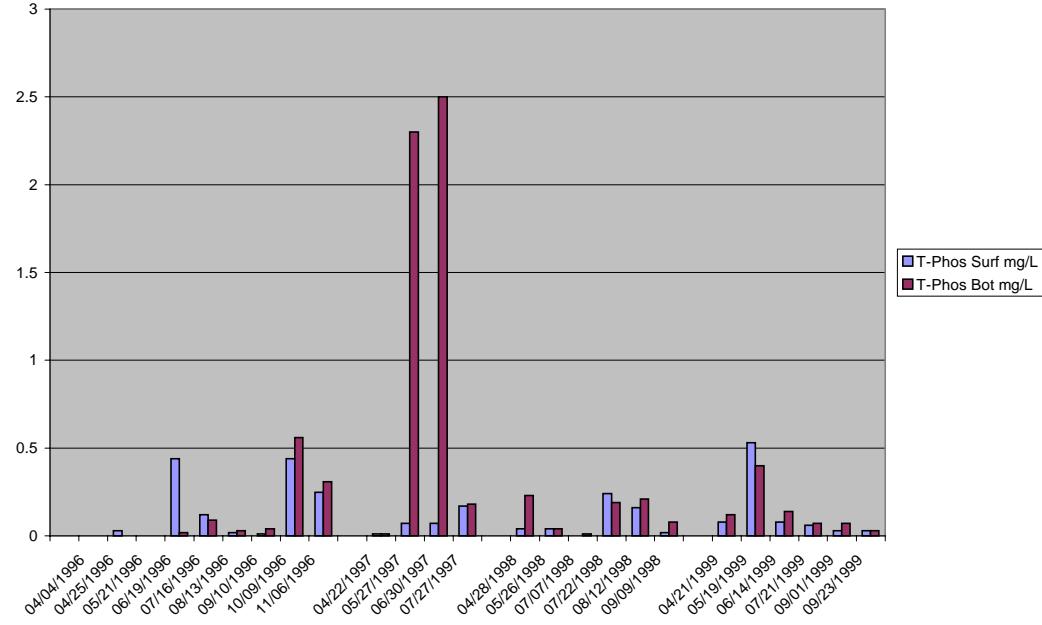


FIGURE 8: ME-16

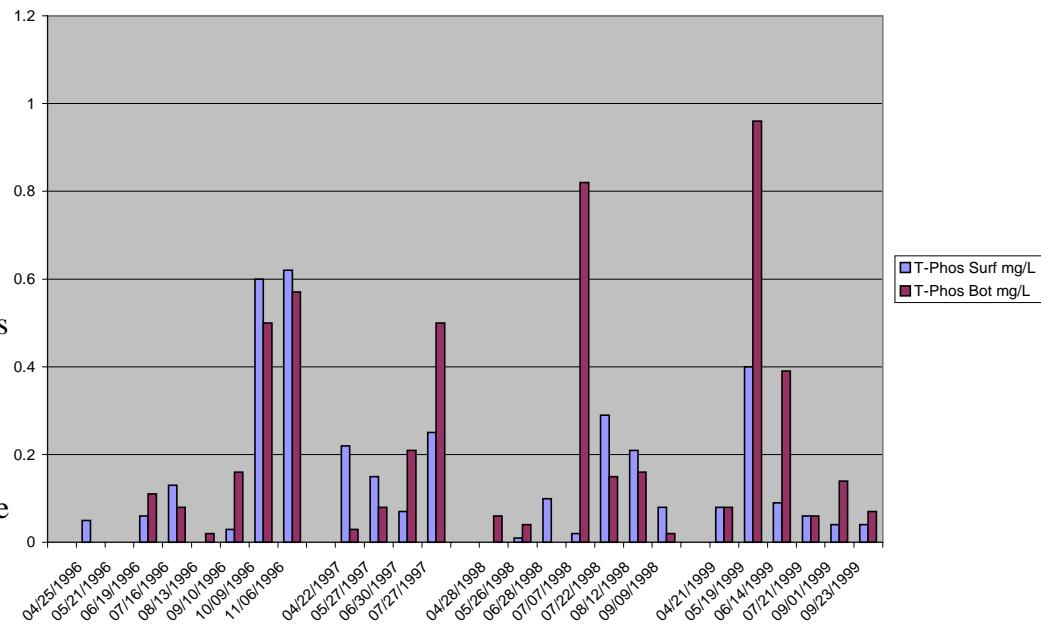
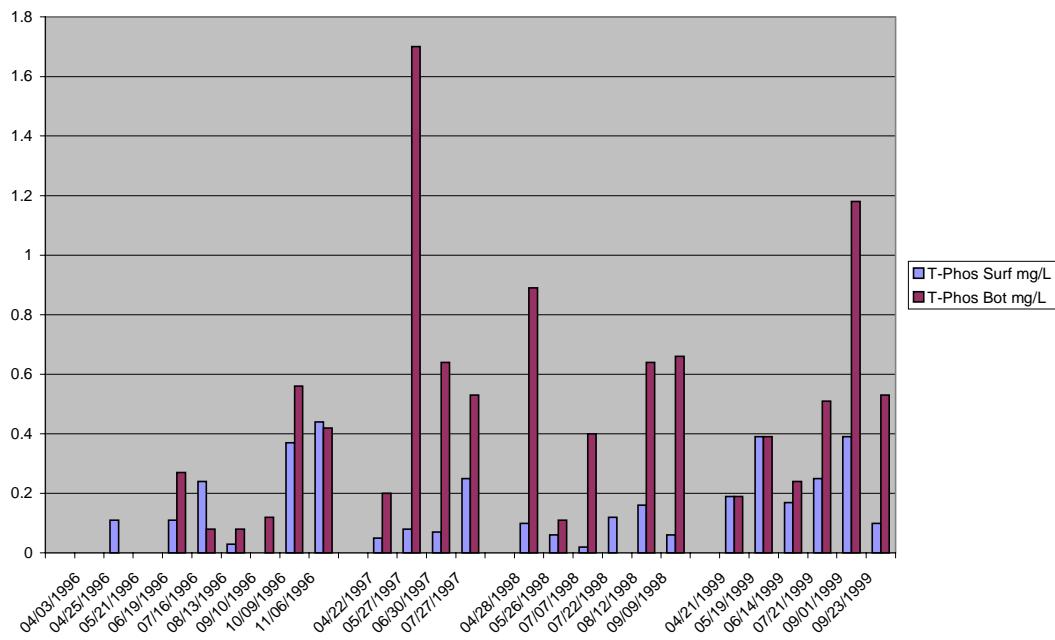
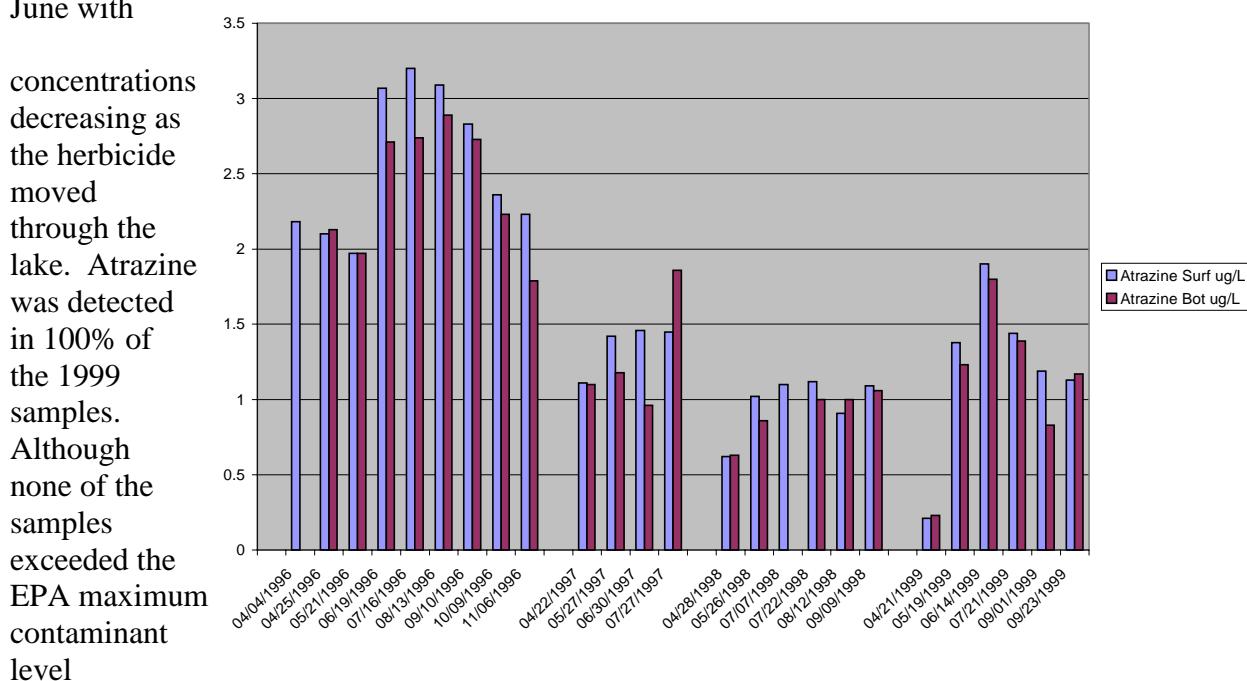


FIGURE 9: ME-30



In the monthly surveys, April-September 1999, the four herbicides (atrazine, metolachlor, alachlor, and cyanazine) were detected. Higher concentrations of atrazine were apparent in the uplake area during the spring run-off period of June with



(MCL) of 3 ug/L for drinking water supplies, 86% of the samples exceeded the EPA criterion for the protection of aquatic life (1 ug/L). The mean and maximum concentrations in the surface waters by area were forebay, 1.21 ug/L and 1.9 ug/L, respectively; midlake, 1.25 ug/L and 1.93 ug/L, respectively; and uplake, 1.63 ug/L and 2.78 ug/L, respectively. Bottom mean atrazine concentrations were about the same as in the surface waters.

Figures 10, 11, and 12 show the trend for atrazine for the years 1996-1999.

As can be seen from these graphs, higher concentrations occur throughout the lake in early spring during the high runoff periods and then level off.

For the most part concentrations are uniform

FIGURE 11: ME-16

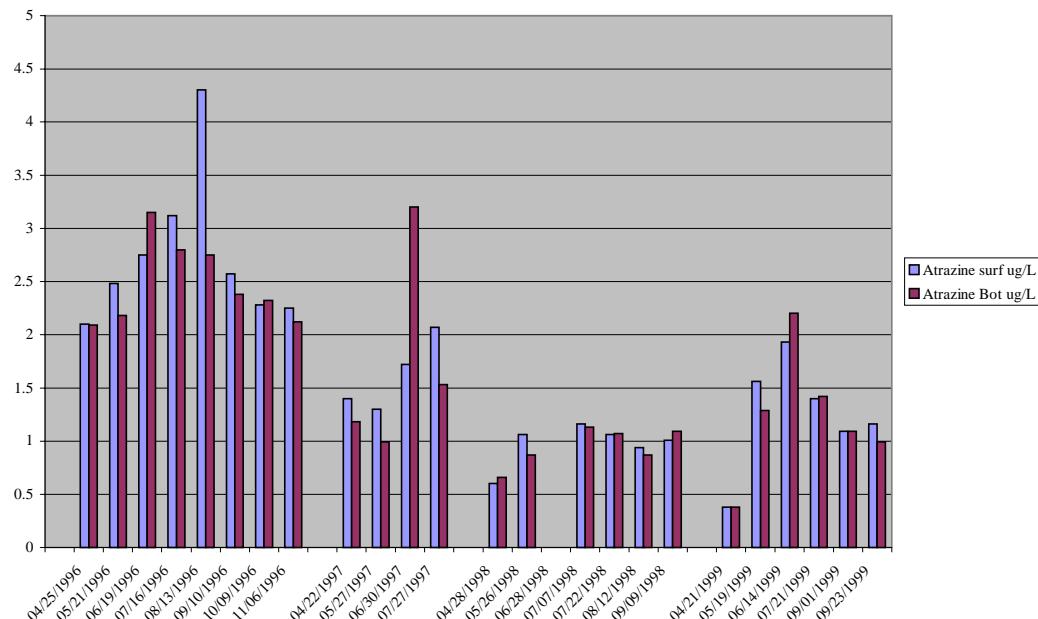
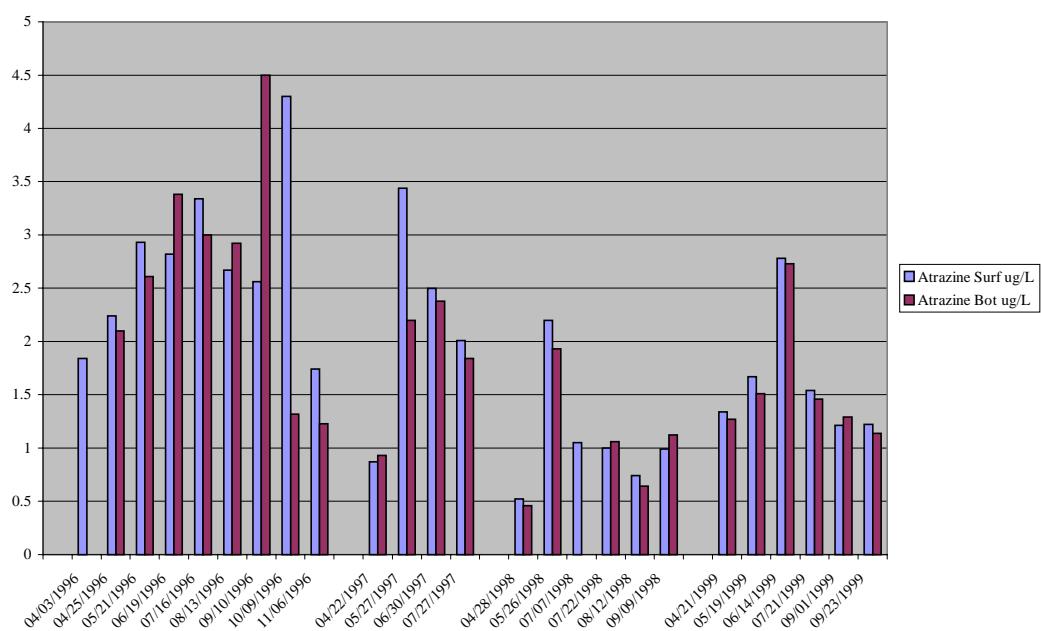


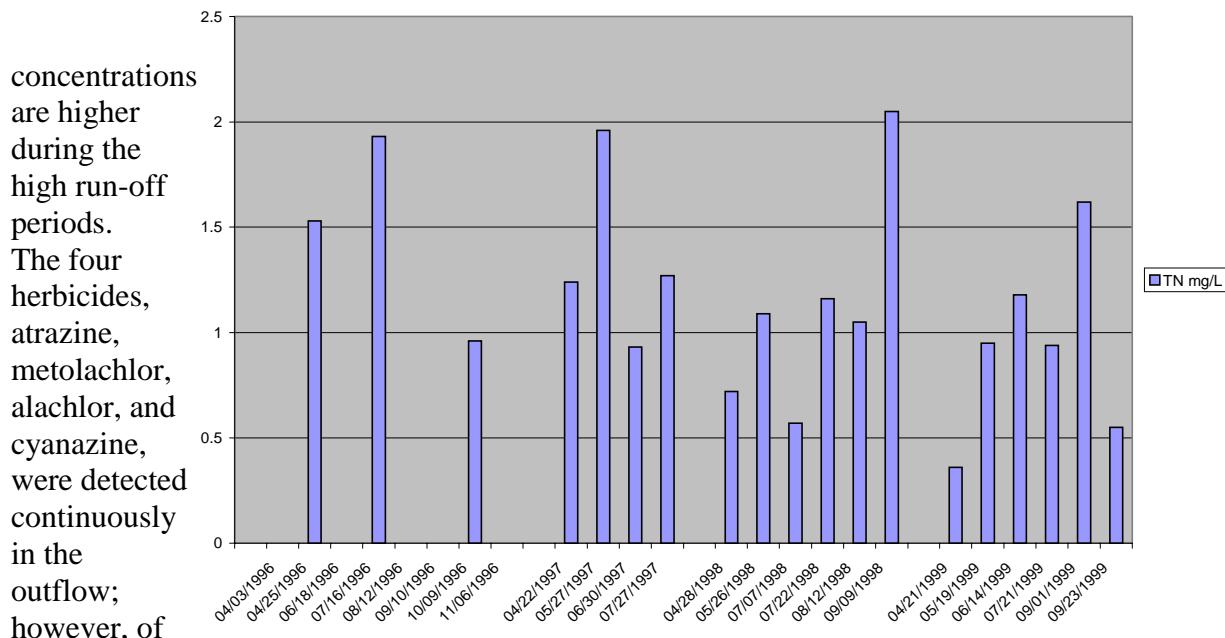
FIGURE 12: ME-30



throughout the water column. The remaining herbicide concentrations did not exceed established criteria.

c. **Outflow.** The present sampling indicated the water quality conditions in the outlet (ME-2) continue to be satisfactory. The nutrient levels remained moderately enriched with mean total nitrogen and total phosphorus concentrations of 0.93 mg/L and 0.15 mg/L, respectively. Again as shown in figures 13 and 14, the

FIGURE 13: ME-2



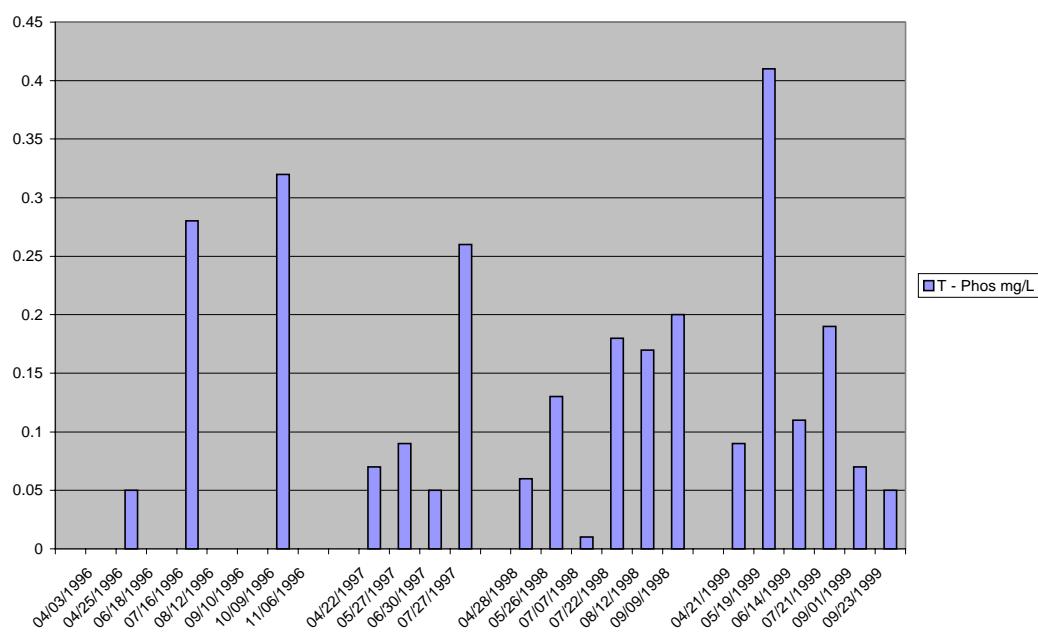
concentrations are higher during the high run-off periods. The four herbicides, atrazine, metolachlor, alachlor, and cyanazine, were detected continuously in the outflow; however, of those with established MCLs, none exceeded their respective criterion. Atrazine was found in highest concentrations with a mean and maximum of 1.00 ug/L and 1.69 ug/L, respectively.

Figure 15 shows the trend for atrazine for the years 1996-1999. As can be seen from this

graph, concentrations for the last three years seem to be leveling off close to 1 ug/L the EPA criterion for the protection of wildlife. The mean and maximum concentrations for alachlor were 0.15 ug/L and 0.49 ug/L, respectively.

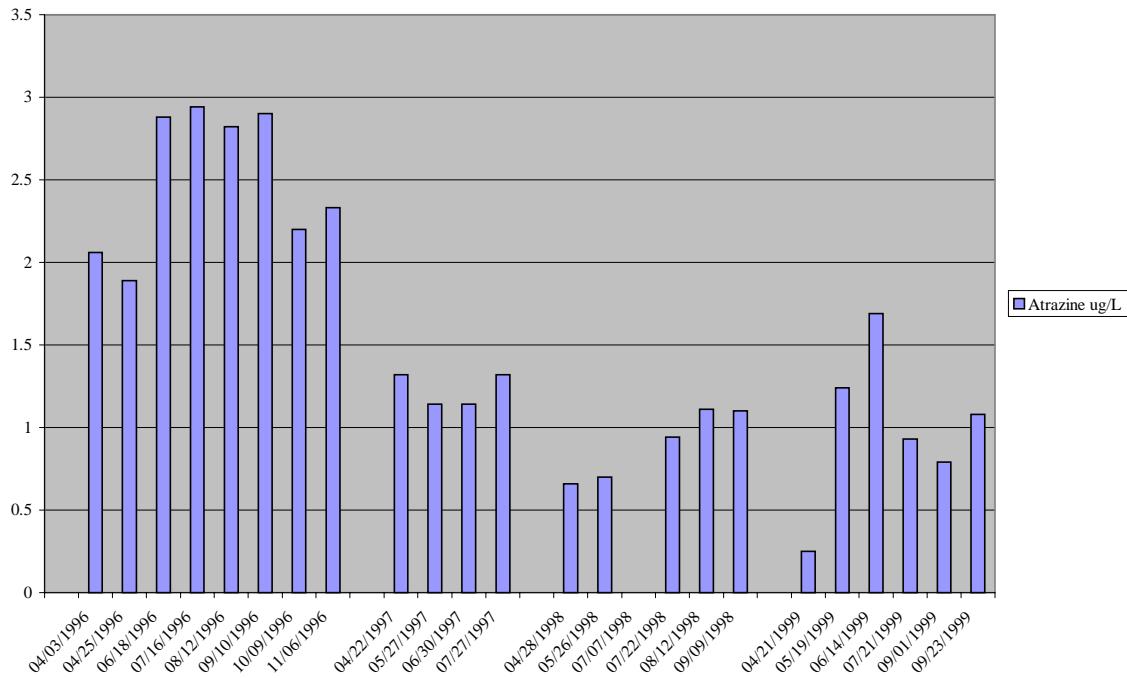
Mean concentrations for

FIGURE 14: ME-2



metolachlor and cyanize were extremely low (0.09 ug/L and 0.07 ug/L, respectively).

FIGURE 15: ME-2



4. Future conditions.

The water quality of Melvern Lake is moderately good overall as evidenced by its excellent sport fishery of crappie, walleye, channel catfish, white bass, bluegill, and black bass. The parameters most responsible for the reservoir's water quality will continue to be turbidity, suspended solids, metals, and nutrients; however, the greatest potential threat to water quality is pesticide loading derived from agricultural run-off from row crops within the watershed. Atrazine concentrations for the period of record show a continued exceedence of the EPA criterion of 1 ug/L for the protection of aquatic life. The concentrations in many periods exceed the EPA maximum contaminant level (MCL) of 3 ug/L, which is the maximum permissible level of a contaminant in public drinking water supplies. Past monitoring has shown that the pesticide levels pose a continuing threat to the drinking water supplies for the project, recreation areas, and rural water districts, since present water treatment is inadequate to significantly reduce these pollutants in the finished water unless costly activated carbon filtration is performed.

5. Recommendations.

With the current staffing and funding levels, the water quality surveillance program for Melvern Lake will continue to be limited in 2000. Routine monthly pesticide sampling should

continue to be conducted by Project personnel with logistical and analytical support from PM-PR-W. The extension of the Lower Osage River Basin Model to include the Upper Osage River Basin should be attempted in-house or contracted out in 2001. The District should enlist the other state and Federal agencies in developing a cooperative water quality monitoring and abatement program for Melvern Lake and its watershed in 2001.

TABLE 1: MELVERN LAKE DATA 1996-1999

Station	Depth M	Date mm/dd/yy	Time hh/mm	Atrazine ug/L	Alachlor ug/L	Metolachlor ug/L	Cyanazine ug/L	Ammonia mg/L	NO3/NO2 mg/L	TKN mg/L	TN mg/L	T - Phos mg/L	T - Ortho-P mg/L
ME - 41	0.1	04/03/1996	1605	0.34	0.09	0.05	0.06	0.07	1.74	0.6	2.41	0.13	0.02
	0.1	04/25/1996	1030	1.6	0.19	0.34	0.13	0.28	1.21	1	2.49	0.13	0.01
	0.1	05/21/1996	1302	1.71	0.33	0.43	0.17	0.06	0.81	0.6	1.47	0.1	0.01
	0.1	06/18/1996	1310	3.65	0.09	0.7	0.12	0.02	1.68	0.5	2.2	0.12	0.07
	0.1	07/16/1996	1210	0.6	0.4	1.8	<0.1	<0.02	1.71	1.3	3.01	0.31	0.02
	0.1	08/12/1996	1347	7.1	<0.1	0.2	<0.1						0.01
	0.1	09/10/1996	1255	0.7	0.1	<0.1	<0.1	0.4	0.85	1.1	2.35	0.12	0.01
	0.1	10/09/1996	1125	<0.05	<0.05	<0.05	<0.04	0.02	0.15	1.3	1.47	0.08	0.11
	0.1	11/06/1996	1400	0.08	<0.05	<0.05	<0.04	0.37	0.85	1.7	2.92	0.46	0.11
	Average			1.97	0.20	0.59	0.12	0.17	1.13	1.01	2.29	0.18	0.04
ME - 41	0.1	04/22/1997	1300	0.39	0.09	0.39	0.12	0.55	0.7	0.9	2.15	0.06	0.02
	0.1	05/27/1997	1400	1.1	<0.1	<0.1	<0.1	0.72	0.7	1.8	3.22	0.15	0.07
	0.1	06/30/1997	1200	3.88	0.68	0.79	0.18	<0.02	0.07	0.5	0.57	0.08	0.04
	Average			6.8	<0.1	0.9	<0.1	0.32	0.01	0.7	1.03	0.22	0.03
ME - 41				3.04	0.39	0.69	0.15	0.53	0.37	0.98	1.74	0.13	0.04
	0.1	04/28/1998	0830	0.17	<0.05	0.2	<0.04	0.09	0.13	0.4	0.62	0.07	0.01
	0.1	05/26/1998	1130	1.09	0.11	0.1	0.11	0.31	0.03	1	1.34	0.06	0.03
	0.1	07/07/1998	0910	1.62	0.09	0.12	0.11	0.27	1.2	0.7	2.17	0.05	0.03
	0.1	07/22/1998	0800	0.49	0.09	0.16	0.04	0.03	0.03	0.7	0.76	0.09	0.05
	0.1	08/12/1998	0730	0.12	<0.05	<0.05	<0.04	0.07	0.24	1.7	2.01	0.24	0.07
	Average			0.09	<0.05	0.07	<0.04	0.08	0.06	1.1	1.24	0.11	0.07
ME - 41				0.60	0.10	0.13	0.09	0.14	0.28	0.93	1.36	0.10	0.04
	0.1	04/21/1999	0915	0.38	<0.05	0.16	<0.04	U	0.82	0.22	1.04	0.13	0.08
	0.1	05/19/1999	0830	1.79	0.37	0.22	0.08	0.03	0.66	0.61	1.3	0.41	0.07
	0.1	06/14/1999	0800	2.45	0.06	0.2	0.12	0.12	0.38	1.29	1.79	0.15	0.02
	0.1	07/21/1999	0830	0.76	0.06	0.18	0.15	0.11	U	0.68	0.79	0.14	0.03
	0.1	09/01/1999	0800	1.61	<0.05	0.2	0.1	0.09	U	0.74	0.83	0.09	0.02
Average				0.27	<0.05	<0.05	<0.04	0.02	0.07	0.45	0.54	0.09	0.05
				1.21	0.16	0.19	0.11	0.07	0.48	0.67	1.05	0.17	0.05
ME - 2	0.1	04/03/1996	1430	2.06	0.23	0.1	0.14						
	0.1	04/25/1996	1210	1.89	0.43	0.15	0.2	0.06	0.77	0.7	1.53	0.05	0.01
	0.1	06/18/1996	1230	2.88	0.29	0.38	0.21						
	0.1	07/16/1996	1303	2.94	0.3	<0.05	0.09	0.28	0.85	0.8	1.93	0.28	0.06
	0.1	08/12/1996	1308	2.82	0.26	0.4	0.18						
	0.1	09/10/1996	1338	2.9	0.37	0.4	0.2						
	0.1	10/09/1996	1040	2.2	0.21	0.16	0.12	0.02	0.14	0.8	0.96	0.32	0.03
	Average			2.33	0.13	0.17	0.09	0.12	0.59	0.77	1.47	0.22	0.03

Station	Depth M	Date mm/dd/yy	Time hh/mm	Atrazine ug/L	Alachlor ug/L	Metolachlor ug/L	Cyanazine ug/L	Ammonia mg/L	NO3/NO2 mg/L	TKN mg/L	TN mg/L	T - Phos mg/L	T - Ortho-P mg/L
ME - 2	0.1	04/22/1997	0845	1.32	0.17	0.09	0.19	0.57	0.07	0.6	1.24	0.07	0.01
	0.1	05/27/1997	1440	1.14	0.07	2.81	0.13	0.53	0.33	1.1	1.96	0.09	0.05
	0.1	06/30/1997	1230	1.14	0.32	0.19	0.13	0.07	0.36	0.5	0.93	0.05	0.02
	0.1	07/27/1997	1915	1.32	0.21	0.25	0.07	0.08	0.29	0.9	1.27	0.26	0.03
	Average			1.23	0.19	0.84	0.13	0.31	0.26	0.78	1.35	0.12	0.03
ME - 2	0.1	04/28/1998	0735	0.66	<0.05	<0.05	0.07	0.06	0.36	0.3	0.72	0.06	0.03
	0.1	05/26/1998	0840	0.7	0.04	0.25	0.05	0.03	0.46	0.6	1.09	0.13	0.05
	0.1	07/07/1998	1300					0.21	0.06	0.3	0.57	0.01	0.01
	0.1	07/22/1998	0900	0.94	0.05	0.15	0.08	0.43	0.03	0.7	1.16	0.18	0.05
	0.1	08/12/1998	0800	1.11	<0.05	0.07	0.07	0.04	0.11	0.9	1.05	0.17	<0.01
	0.1	09/09/1998	0900	1.1	<0.05	0.14	0.07	0.63	0.12	1.3	2.05	0.2	0.07
	Average			0.90	0.05	0.15	0.07	0.23	0.19	0.68	1.11	0.13	0.04
ME - 2	0.1	04/21/1999	1200	0.25	< 0.05	< 0.05	< 0.04	U	0.23	0.13	0.36	0.09	0.05
	0.1	05/19/1999	0915	1.24	0.06	0.19	0.05	U	0.5	0.45	0.95	0.41	0.05
	0.1	06/14/1999	0830	1.69	0.12	0.4	0.1	U	0.59	0.59	1.18	0.11	0.04
	0.1	07/21/1999	1000	0.93	0.1	0.49	0.07	0.16	0.29	0.49	0.94	0.19	0.08
	0.1	09/01/1999	0830	0.79	0.1	0.31	0.07	0.71	U	0.91	1.62	0.07	0.04
	0.1	09/23/1999	0930	1.08	0.07	0.44	0.06	0.06	0.23	0.26	0.55	0.05	0.02
	Average			1.00	0.09	0.37	0.07	0.31	0.37	0.47	0.93	0.15	0.05
ME - 3	0.1	04/04/1996	1624	2.18	0.2	0.1	0.13						
	0.1	04/25/1996	0815	2.1	0.26	0.13	0.19	<0.02	0.02	0.5	0.52	0.03	0.01
	0.1	05/21/1996	1045	1.97	0.26	0.25	0.15	0.5	0.14	0.4	1.04		
	0.1	06/19/1996	0830	3.07	0.22	0.33	0.09	0.26	0.51	0.3	1.07	0.44	<0.01
	0.1	07/16/1996	0815	3.2	0.25	<0.05	0.11	<0.02	0.11	0.4	0.51	0.12	<0.01
	0.1	08/13/1996	0830	3.09	0.27	0.45	0.25	0.04	0.04	0.5	0.58	0.02	0.01
	0.1	09/10/1996	1330	2.83	0.18	0.34	0.19	0.24	0.03	0.5	0.77	0.01	<0.01
	0.1	10/09/1996	0815	2.36	0.12	0.25	0.12	<0.02	0.04	1	1.04	0.44	0.02
	0.1	11/06/1996	1100	2.23	0.14	0.13	0.11	0.46	0.12	0.7	1.28	0.25	<0.01
	Average			2.56	0.21	0.25	0.15	0.30	0.13	0.54	0.85	0.19	0.01
ME - 3	0.1	04/22/1997	0930	1.11	0.11	0.16	0.08	0.4	0.06	0.6	1.06	0.01	0.01
	0.1	05/27/1997	1140	1.42	0.09	0.12	0.09	0.61	0.29	0.9	1.8	0.07	0.03
	0.1	06/30/1997	1030	1.46	0.33	0.3	0.15	<0.02	0.11	0.3	0.41	0.07	0.02
	0.1	07/27/1997	1730	1.45	<0.05	0.3	0.08	0.12	0.03	0.6	0.75	0.17	0.01
Average				1.36	0.18	0.22	0.10	0.38	0.12	0.60	1.01	0.08	0.02

Station	Depth M	Date mm/dd/yy	Time hh/mm	Atrazine ug/L	Alachlor ug/L	Metolachlor ug/L	Cyanazine ug/L	Ammonia mg/L	NO3/NO2 mg/L	TKN mg/L	TN mg/L	T - Phos mg/L	T - Ortho-P mg/L
ME - 3	0.1	04/28/1998	1240	0.62	0.06	<0.05	0.06	0.1	0.29	0.2	0.59	0.04	0.02
	0.1	05/26/1998	0905	1.02	<0.05	0.11	0.07	0.04	0.22	0.6	0.86	0.04	0.02
	0.1	07/07/1998	1200	1.1	<0.05	0.09	0.09	0.08	0.08	0.2	0.36	<0.01	<0.01
	0.1	07/22/1998	1215	1.12	0.07	0.16	0.1	<0.02	0.03	0.3	0.33	0.24	0.03
	0.1	08/12/1998	1000	0.91	0.06	0.08	0.09	<0.02	0.06	0.9	0.96	0.16	0.07
	0.1	09/09/1998	1040	1.09	<0.05	0.1	0.07	0.05	0.12	0.4	0.57	0.02	0.02
Average				0.98	0.06	0.11	0.08	0.07	0.13	0.43	0.61	0.10	0.03
ME - 3	0.1	04/21/1999	1115	0.21	<0.05	<0.05	<0.04	U	0.23	0.12	0.35	0.08	0.04
	0.1	05/19/1999	1115	1.38	0.05	0.26	0.07	0.06	0.51	0.99	1.56	0.53	0.05
	0.1	06/14/1999	1000	1.9	0.09	0.41	0.1	0.02	0.56	0.51	1.09	0.08	0.05
	0.1	07/21/1999	1100	1.44	0.12	0.53	0.09	0.02	0.48	0.22	0.72	0.06	0.03
	0.1	09/01/1999	1130	1.19	0.1	0.3	0.08	0.03	0.26	0.27	0.56	0.03	0.01
	0.1	09/23/1999	1015	1.13	0.09	0.51	0.06	U	0.22	0.17	0.39	0.03	0.02
Average				1.21	0.09	0.40	0.08	0.03	0.38	0.38	0.78	0.14	0.03
ME-3	18	04/05/1996	1642										
	18	04/25/1996	0833	2.13	0.22	0.12	0.18	<0.02	0.01	0.3	0.31	<0.01	
	21	05/21/1996	1106	1.97	0.29	0.3	0.16	0.44	0.17	0.4	1.01		
	20	06/19/1996	0850	2.71	0.27	0.38	0.15	3.45	0.46	0.2	4.11	0.02	0.03
	20	07/16/1996	0835	2.74	0.26	<0.05	0.12	0.12	0.26	0.3	0.68	0.09	
	21	08/13/1996	0851	2.89	0.36	0.44	0.18	0.35	<0.01	1.1	1.45	0.03	0.04
	19	09/10/1996	1349	2.73	0.52	0.34	0.18	0.2	0.03	0.8	1.03	0.04	<0.01
	19	10/09/1996	0834	2.23	0.25	0.23	0.11	0.64	0.66	0.5	1.8	0.56	
	21	11/06/1996	1121	1.79	0.15	0.18	0.11	0.37	0.12	0.6	1.09	0.31	<0.01
	Average				2.40	0.29	0.28	0.15	0.80	0.24	0.53	1.44	0.18
ME - 3	20	04/22/1997	0950	1.1	0.08	0.06	0.16	0.4	0.02	0.8	1.22	0.01	0.01
	21	05/27/1997	1201	1.18	0.22	0.11	0.1	0.77	0.09	8.4	9.26	2.3	0.08
	20	06/30/1997	1050	0.96	0.34	0.1	0.13	0.37	0.59	4.9	5.86	2.5	0.24
	20	07/27/1997	1750	1.86	<0.05	0.33	0.1	0.22	0.05	0.5	0.77	0.18	0.01
	Average				1.28	0.21	0.15	0.12	0.44	0.19	3.65	4.28	1.25
ME - 3	20	04/28/1998	1300	0.63	<0.05	<0.05	0.04	0.07	0.29	0.3	0.66	0.23	0.02
	20	05/26/1998	0925	0.86	<0.05	0.07	0.08	<0.01	0.22	0.6	0.82	0.04	0.02
	20	07/07/1998	1220					0.4	0.06	0.5	0.96	0.01	<0.01
	20	07/22/1998	1235	1	0.05	0.09	0.1	0.07	0.03	0.3	0.4	0.19	0.03
	20	08/12/1998	1020	1	0.06	0.1	0.09	0.05	0.16	1.3	1.51	0.21	0.04
	20	09/09/1998	1100	1.06	<0.05	0.11	0.08	0.09	0.06	0.4	0.55	0.08	0.02
Average				0.91	0.06	0.09	0.08	0.14	0.14	0.57	0.82	0.13	0.03

Station	Depth M	Date mm/dd/yy	Time hh/mm	Atrazine ug/L	Alachlor ug/L	Metolachlor ug/L	Cyanazine ug/L	Ammonia mg/L	NO3/NO2 mg/L	TKN mg/L	TN mg/L	T - Phos mg/L	T - Ortho-P mg/L
ME - 3	20	04/21/1999	1135	0.23	< 0.05	< 0.05	< 0.04	U	0.22	0.27	0.49	0.12	0.03
	20	05/19/1999	1135	1.23	0.06	0.21	0.07	U	0.51	0.47	0.98	0.4	0.05
	20	06/14/1999	1020	1.8	0.13	0.41	0.09	0.11	0.59	0.81	1.51	0.14	0.03
	20	07/21/1999	1120	1.39	0.12	0.55	0.08	0.03	0.46	0.3	0.79	0.07	0.03
	20	09/01/1999	1150	0.83	0.09	0.42	0.08	0.58	0.04	0.82	1.44	0.07	0.03
	20	09/23/1999	1035	1.17	0.08	0.41	0.06	U	0.22	0.19	0.41	0.03	0.02
Average				1.11	0.10	0.40	0.08	0.24	0.34	0.48	0.94	0.14	0.03
ME - 16	0.1	04/25/1996	1230	2.1	0.36	0.1	0.2	0.09	0.02	0.5	0.61	0.05	0.01
	0.1	05/21/1996	1145	2.48	0.33	0.5	0.18	0.62	0.22	0.4	1.24		
	0.1	06/19/1996	1000	2.75	0.28	0.46	0.12	0.28	0.26	0.4	0.94	0.06	0.01
	0.1	07/16/1996	1015	3.12	0.39	<0.05	0.11	0.08	0.3	0.1	0.48	0.13	<0.01
	0.1	08/13/1996	0910	4.3	<0.1	0.5	<0.1	<0.02	0.01	0.5	0.51	<0.01	<0.01
	0.1	09/10/1996	1415	2.57	0.16	0.32	0.15	0.25	0.02	0.5	0.77	0.03	<0.01
	0.1	10/09/1996	1100	2.28	0.19	0.22	0.1	<0.02	0.13	0.6	0.73	0.6	0.02
	0.1	11/06/1996	1345	2.25	0.2	0.18	0.1	0.27	0.13	0.6	1	0.62	<0.01
Average				2.73	0.27	0.33	0.14	0.27	0.14	0.45	0.79	0.25	0.01
ME - 16	0.1	04/22/1997	1030	1.4	<0.1	<0.1	<0.1	0.1	0.05	0.6	0.75	0.22	0.01
	0.1	05/27/1997	1030	1.3	0.18	0.14	0.09	0.7	0.24	0.9	1.84	0.15	0.03
	0.1	06/30/1997	0940	1.72	0.3	0.46	0.13	<0.02	0.15	0.1	0.25	0.07	0.03
	0.1	07/27/1997	1530	2.07	0.09	0.34	0.13	0.09	0.01	0.6	0.7	0.25	0.01
Average				1.62	0.19	0.31	0.12	0.30	0.11	0.55	0.89	0.17	0.02
ME - 16	0.1	04/28/1998	0930	0.6	0.05	0.05	0.08						
	0.1	05/26/1998	0945	1.06	<0.05	0.08	0.08	0.01	0.22	0.5	0.73	0.01	0.01
	0.1	06/28/1998	0930					0.05	0.29	0.2	0.54	0.1	0.02
	0.1	07/07/1998	1120	1.16	0.11	0.11	0.11	0.18	0.05	0.39	0.62	0.02	0.01
	0.1	07/22/1998	1145	1.06	<0.05	0.12	0.09	<0.02	0.02	0.3	0.32	0.29	0.02
	0.1	08/12/1998	0930	0.94	<0.05	0.08	0.07	<0.02	0.04	1	1.04	0.21	0.03
	0.1	09/09/1998	1010	1.01	<0.05	0.11	0.06	0.06	0.08	0.4	0.54	0.08	0.03
Average				0.97	0.08	0.09	0.08	0.08	0.12	0.47	0.63	0.12	0.02
ME - 16	0.1	04/21/1999	1015	0.38	< 0.05	< 0.05	0.05	U	0.22	0.16	0.38	0.08	0.05
	0.1	05/19/1999	1040	1.56	0.1	0.39	0.07	0.03	0.63	0.59	1.25	0.4	0.07
	0.1	06/14/1999	0920	1.93	0.13	0.51	0.11	0.05	0.55	0.45	1.05	0.09	0.05
	0.1	07/21/1999	1020	1.4	0.11	0.54	0.1	U	0.55	0.12	0.67	0.06	0.04
	0.1	09/01/1999	1000	1.09	0.1	0.33	0.09	0.02	0.13	0.33	0.48	0.04	U
	0.1	09/23/1999	1110	1.16	0.09	0.45	0.05	U	0.2	0.23	0.43	0.04	0.02
Average				1.25	0.11	0.44	0.08	0.03	0.38	0.31	0.71	0.12	0.05

Station	Depth M	Date mm/dd/yy	Time hh/mm	Atrazine ug/L	Alachlor ug/L	Metolachlor ug/L	Cyanazine ug/L	Ammonia mg/L	NO3/NO2 mg/L	TKN mg/L	TN mg/L	T - Phos mg/L	T - Ortho-P mg/L
ME - 16	11	04/25/1996	1241	2.09	0.21	0.09	0.17	<0.02	0.02	0.3	0.32	<0.01	
	14	05/21/1996	1159	2.18	0.21	0.23	0.14	0.59	0.16	0.5	1.25		
	13	06/19/1996	1013	3.15	0.3	0.6	0.15	0.25	0.55	0.5	1.3	0.11	0.05
	14	07/16/1996	1029	2.8	0.18	<0.05	0.11	0.1	0.19	0.2	0.49	0.08	
	14	08/13/1996	0924	2.75	0.26	0.51	0.28	0.24	<0.01	0.8	1.04	0.02	0.03
	14	09/10/1996	1429	2.38	0.22	0.24	0.13	0.24	<0.01	0.7	0.94	0.16	<0.01
	12	10/09/1996	1112	2.32	0.1	0.18	0.11	0.53	0.97	0.5	2	0.5	
	14	11/06/1996	1359	2.12	0.12	0.23	0.1	0.45	0.13	1	1.58	0.57	<0.01
	Average			2.47	0.20	0.30	0.15	0.34	0.34	0.56	1.12	0.24	0.04
ME - 16	16	04/22/1997	1046	1.18	0.26	0.32	0.09	0.64	0.08	0.7	1.42	0.03	0.01
	17	05/27/1997	1047	0.99	0.14	2.56	0.12	0.76	0.3	1	2.06	0.08	0.04
	15	06/30/1997	0955	3.2	0.24	0.24	0.09	0.1	0.36	1.2	1.66	0.21	0.19
	15	07/27/1997	1545	1.53	0.17	0.3	0.09	0.32	0.01	1.4	1.73	0.5	0.04
	Average			1.73	0.20	0.86	0.10	0.46	0.19	1.08	1.72	0.21	0.07
ME - 16	15	04/28/1998	0945	0.66	<0.05	<0.05	0.06	0.08	0.3	0.3	0.68	0.06	0.02
	15	05/26/1998	1000	0.87	<0.05	<0.05	0.09	0.02	0.21	0.5	0.73	0.04	0.01
	15	06/28/1998	0945										
	12	07/07/1998	1132	1.13	0.06	0.12	0.09	0.74	0.04	4.1	4.88	0.82	0.08
	15	07/22/1998	1200	1.07	0.09	0.32	0.11	0.09	0.03	0.4	0.52	0.15	0.05
	15	08/12/1998	0945	0.87	0.06	0.1	0.08	<0.02	0.14	1.3	1.44	0.16	0.04
	15	09/09/1998	1025	1.09	<0.05	0.14	0.08	0.1	0.1	0.5	0.7	0.02	0.02
	Average			0.95	0.07	0.17	0.09	0.21	0.14	1.18	1.49	0.21	0.04
ME - 16	15	04/21/1999	1030	0.38	<0.05	<0.05	<0.04	U	0.22	0.39	0.61	0.08	0.03
	15	05/19/1999	1055	1.29	0.07	0.19	0.07	U	0.45	1.87	2.32	0.96	0.03
	15	06/14/1999	0935	2.2	0.11	0.53	0.1	0.17	0.54	1.28	1.99	0.39	0.03
	15	07/21/1999	1035	1.42	0.12	0.5	0.09	0.05	0.52	0.16	0.73	0.06	0.04
	15	09/01/1999	1015	1.09	0.09	0.32	0.06	0.07	0.26	0.66	0.99	0.14	0.04
	15	09/23/1999	1125	0.99	0.11	0.4	0.07	0.02	0.19	0.28	0.49	0.07	0.03
ME - 30	Average			1.23	0.10	0.39	0.08	0.08	0.36	0.77	1.19	0.28	0.03
	0.1	04/03/1996	1532	1.84	0.22	0.07	0.11						
	0.1	04/25/1996	1040	2.24	0.22	0.09	0.15	<0.02	<0.01	0.6	0.6	0.11	0.02
	0.1	05/21/1996	1245	2.93	0.32	0.77	0.22	0.69	0.33	0.6	1.62		
	0.1	06/19/1996	1045	2.82	0.32	0.63	0.12	0.02	0.33	0.3	0.65	0.11	0.06
	0.1	07/16/1996	1105	3.34	0.24	<0.05	0.1	0.04	<0.01	0.5	0.54	0.24	0.01
	0.1	08/13/1996	1000	2.67	0.25	0.43	0.25	<0.02	0.02	0.6	0.62	0.03	0.01
	0.1	09/10/1996	1500	2.56	0.19	0.28	0.16	0.34	0.03	0.6	0.97	<0.01	<0.01
	0.1	10/09/1996	1015	4.3	0.18	0.21	0.12	0.03	0.17	1.5	1.7	0.37	0.04
	0.1	11/06/1996	1230	1.74	0.08	0.17	0.08	0.37	0.15	1	1.52	0.44	0.02
ME - 30	Average			2.72	0.22	0.33	0.15	0.25	0.17	0.71	1.03	0.22	0.03

Station	Depth M	Date mm/dd/yy	Time hh/mm	Atrazine ug/L	Alachlor ug/L	Metolachlor ug/L	Cyanazine ug/L	Ammonia mg/L	NO3/NO2 mg/L	TKN mg/L	TN mg/L	T - Phos mg/L	T - Ortho-P mg/L
ME - 30	0.1	04/22/1997	1118	0.87	0.22	0.88	0.05	0.37	0.52	0.9	1.79	0.05	0.04
	0.1	05/27/1997	1005	3.44	0.1	5.36	0.19	0.83	0.14	1.3	2.27	0.08	0.04
	0.1	06/30/1997	0900	2.5	0.78	0.61	0.26	0.08	0.17	0.8	1.05	0.07	0.06
	0.1	07/27/1997	1500	2.01	0.07	0.31	0.1	0.21	0.01	0.6	0.82	0.25	0.03
	Average			2.21	0.29	1.79	0.15	0.37	0.21	0.90	1.48	0.11	0.04
ME - 30	0.1	04/28/1998	1020	0.52	<0.05	0.07	0.05	0.07	0.29	0.5	0.86	0.1	0.03
	0.1	05/26/1998	1030	2.2	<0.05	0.6	0.19	0.06	0.1	1	1.16	0.06	0.03
	0.1	07/07/1998	1100	1.05	0.16	0.13	0.11	0.11	0.02	0.4	0.53	0.02	0.01
	0.1	07/22/1998	1120	1	0.06	0.08	0.08	<0.02	0.03	0.2	0.23	0.12	0.03
	0.1	08/12/1998	0910	0.74	<0.05	0.1	0.07	<0.02	0.12	1.6	1.72	0.16	0.05
	0.1	09/09/1998	0945	0.99	<0.05	0.13	0.07	0.03	0.08	0.7	0.81	0.06	0.05
	Average			1.08	0.11	0.19	0.10	0.07	0.11	0.73	0.89	0.09	0.03
ME - 30	0.1	04/21/1999	0930	1.34	0.1	0.87	0.09	U	0.83	1.24	2.07	0.19	0.08
	0.1	05/19/1999	0945	1.67	0.11	0.5	0.08	0.06	0.57	0.64	1.27	0.39	0.07
	0.1	06/14/1999	0900	2.78	0.14	0.79	0.17	0.11	0.57	0.95	1.63	0.17	0.04
	0.1	07/21/1999	0930	1.54	0.11	0.47	0.14	0.11	0.17	1.07	1.35	0.25	0.08
	0.1	09/01/1999	0940	1.21	0.1	0.28	0.08	0.17	U	1.18	1.35	0.39	0.07
	0.1	09/23/1999	1100	1.22	0.09	0.48	0.07	U	0.13	0.43	0.56	0.1	0.08
	Average			1.63	0.11	0.57	0.11	0.11	0.45	0.92	1.37	0.25	0.07
ME-30	3	04/03/1996	1534										
	3	04/25/1996	1043	2.1	0.24	0.11	0.2	<0.02	0.02	0.5	0.52	<0.01	
	4.8	05/21/1996	1250	2.61	0.38	0.71	0.2	0.72	0.33	0.6	1.65		
	5	06/19/1996	1050	3.38	0.28	0.69	0.12	0.16	0.45	0.5	1.11	0.27	0.1
	4	07/16/1996	1109	3	0.43	<0.05	0.12	0.04	<0.01	0.2	0.24		0.08
	4	08/13/1996	1004	2.92	0.28	<0.05	0.18	0.35	0.06	1	1.41	0.08	0.04
	4.8	09/10/1996	1505	4.5	0.1	0.3	<0.1	0.29	0.01	1	1.3	0.12	0.02
	5	10/09/1996	1020	1.32	0.18	0.13	0.05	0.51	1.24	0.8	2.55	0.56	
	4.8	11/06/1996	1235	1.23	0.12	0.17	0.07	0.33	0.16	1.4	1.89	0.42	0.03
	Average			2.63	0.25	0.35	0.13	0.34	0.32	0.75	1.33	0.26	0.05
ME - 30	6	04/22/1997	1124	0.93	0.36	1.04	0.11	0.57	0.47	1.1	2.14	0.2	0.05
	6	05/27/1997	1011	2.2	0.22	4.78	0.18	0.74	0.01	5.6	6.35	1.7	0.07
	5	06/30/1997	0905	2.38	0.54	0.54	0.16	0.19	0.25	3	3.44	0.64	0.28
	5	07/27/1997	1505	1.84	0.18	0.36	0.08	0.28	0.01	2.5	2.79	0.53	0.08
	Average			1.84	0.33	1.68	0.13	0.45	0.19	3.05	3.68	0.77	0.12

Station	Depth M	Date mm/dd/yy	Time hh/mm	Atrazine ug/L	Alachlor ug/L	Metolachlor ug/L	Cyanazine ug/L	Ammonia mg/L	NO3/NO2 mg/L	TKN mg/L	TN mg/L	T - Phos mg/L	T - Ortho-P mg/L
ME - 30	5	04/28/1998	1025	0.46	<0.05	0.05	0.05	0.12	0.27	2	2.39	0.89	0.05
	5	05/26/1998	1035	1.93	0.05	0.4	0.22	0.04	0.1	1	1.14	0.11	0.04
	5	07/07/1998	1105					0.11	0.03	1.9	2.04	0.4	0.11
	5	07/22/1998	1125	1.06	0.12	0.19	0.1						
	5	08/12/1998	0915	0.64	0.05	0.13	0.06	0.17	0.13	1.1	1.4	0.64	0.06
	5	09/09/1998	0950	1.12	<0.05	0.11	0.07	0.18	0.29	3	3.47	0.66	0.05
Average				1.04	0.07	0.18	0.10	0.12	0.16	1.80	2.09	0.54	0.06
ME - 30	5	04/21/1999	0935	1.27	0.1	0.91	0.08	U	0.82	0.85	1.67	0.19	0.08
	5	05/19/1999	0950	1.51	0.11	0.39	0.08	0.09	0.6	0.6	1.29	0.39	0.07
	5	06/14/1999	0905	2.73	0.12	0.62	0.13	0.2	0.54	1.33	2.07	0.24	0.04
	5	07/21/1999	0935	1.46	0.13	0.5	0.11	0.15	0.35	1.49	1.99	0.51	0.14
	5	09/01/1999	0945	1.29	0.12	0.32	0.09	0.61	0.1	2.05	2.76	1.18	0.12
	5	09/23/1999	1105	1.14	0.09	0.27	0.07	0.09	0.14	1.56	1.79	0.53	0.13
Average				1.57	0.11	0.50	0.09	0.23	0.43	1.31	1.93	0.51	0.10